



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/678,611	10/04/2000	Kohji Sakai	198004US2	7156
22850	7590	04/26/2005	EXAMINER	
OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C.				PHAM, HAI CHI
1940 DUKE STREET				
ALEXANDRIA, VA 22314				
ART UNIT		PAPER NUMBER		
		2861		

DATE MAILED: 04/26/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/678,611	SAKAI ET AL. <i>AM</i>
	Examiner	Art Unit
	Hai C. Pham	2861

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 31 January 2005.
- 2a) This action is **FINAL**. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-22 is/are pending in the application.
 - 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 1-22 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on 31 January 2005 is/are: a) accepted or b) objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date various.
- 4) Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) Notice of Informal Patent Application (PTO-152)
- 6) Other: _____.

FINAL REJECTION

Drawings

1. The drawings were received on 01/31/05. These drawings are accepted by the examiner.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

3. Claims 1-3, 5-9 and 15 are rejected under 35 U.S.C. 102(e) as being anticipated by Takada et al. (U.S. 6,445,483).

Takada et al. discloses an optical scanning apparatus condensing a beam deflected by an optical deflector (polygon mirror 3) so as to form a beam spot on a

surface to be scanned (surface 14), comprising two lenses (first and second scanning lenses 12 and 13, Fig. 1), wherein:

- a lens (first scanning lens 12) on the side of the optical deflector has a negative refracting power in sub-scanning direction (the radius of the entrance surface of the first scanning lens 12, e.g., 72.17772, being larger than the radius of the exit surface of the first scanning lens, e.g., 53.03585) (Table 1),
- a lens (second scanning lens 13) on the side surface to be scanned has a positive refracting power in the sub-scanning direction, and at least one lens surface of the lens surfaces of the two lenses is such that a shape in the sub-scanning section is a non-arc shape (second scanning lens 13 having the exit surface being non-arcuate and having a positive refractive power in the sub-scanning direction) (col. 12, lines 34-59).

Takada et al. further teaches:

- The surface such that a shape in a sub-scanning direction is a non-arc shape is a sub-non-arc surface such that the non-arc shape changes according to the position in main scanning direction of the sub-scanning direction (the exit surface of the second scanning lens 13 being aspherical in the main scanning direction and having a large curvature in the main scanning direction) (col. 12, lines 49-59),
- A shape of the sub-non-arc surface in a main scanning section is a non-arc shape (col. 12, lines 49-59),

- Said optical system comprises an anamorphic optical system (col. 7, lines 45-60),
- In each of the four lens surfaces of the two lenses, the curvatures in the main and sub-scanning directions are different from one another (col. 12, lines 34-59),
- The spot diameter in each of the main and sub-scanning directions is equal to or smaller than 50 Tm (col. 4, lines 54-59),
- A non-arc amount, which is an amount of difference of the non-arc shape in the sub-scanning section of the sub-non-arc from an arc, changes asymmetrically in the main scanning direction (the anamorphic scanning lens 13 having curvature difference between the main and sub-scanning directions and further having a thickness, which differs from one end to the other end of the lens in the sub-scanning direction) (col. 7, lines 4-21),
- The optical scanning device being a single beam system.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takada et al.

Takada et al. teaches the lateral magnification in the sub-scanning direction being set at 0.418 (col. 15, lines 60-61), but fails to disclose the claimed range values. However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to set the lateral magnification in the sub-scanning direction within the desired range values as claimed, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

6. Claims 10, 12, 14 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takada et al. in view of Yamawaki et al. (U.S. 6,046,835).

Takada et al. discloses all the basic limitations of the claimed invention including the two scanning lenses being separate and having an air separation therebetween, but except for the relationship between the lateral magnification in the sub-scanning direction at a central height and that at any image height and the plurality of light emitting sources.

Yamawaki et al. discloses a scanning optical apparatus comprising two laser units (21a and 21b), two scanning lenses (3 and 4) using a single polygon mirror for simultaneously deflecting and scanning the two light beams across the surface of the photosensitive drum (10) forming scan lines separate from each other in the sub-scanning direction, wherein the ratio between the lateral magnifications in the sub-scanning direction at respective on-axis and off-axis is set at 1.0 and can be increased

by 8%, a range that clearly meets the claimed condition (see table 2 and associated discussions).

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to set the ratio of the lateral magnifications at the above value as taught by Yamawaki et al. in the device of Takada et al. The motivation for doing so would have been to provide a high quality image without being affected by the temperature change.

7. Claims 11 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takada et al. in view of Ono (U.S. 6,130,768).

Takada et al. discloses all the basic limitations of the claimed invention except for the relationship between the effective writing width and the width of sub-scanning curvature of field.

Ono teaches an optical scanning apparatus having two scanning image forming lenses (6 and 7) in which the curvature of field in the sub-scanning direction is satisfactorily corrected by maintaining the absolute value of the curvature of field in the sub-scanning direction of about 1 mm or less, and wherein the width of the sub-scanning curvature of field in the effective writing width (161.5 mm x 2 = 323 mm) satisfies the following condition:

$$1\text{mm} / 323\text{ mm} = 0.003 < 0.005$$

(see Fig. 3A and associated discussions at col. 15, lines 1-11).

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to keep the absolute value of the curvature of field in the sub-scanning direction small as taught by Ono in the Takada et al. device. The motivation for doing so would have been to accurately correct all the aberrations in order to allow more accurate printing as suggested by Ono at col. 1, lines 43-55.

8. Claims 17-18, 20 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takada et al. in view of Yamawaki et al., as applied to claims 1, 14 and 16 above, and further in view of Ota et al. (U.S. 5,305,022).

Takada et al., as modified, discloses all the basic limitations of the claimed invention except for the plurality of light sources being provided as a laser array with the interval of the light emitting points equal to or larger than 10 Tm, and the developer.

Ota et al. discloses a multi-beam scanning recording apparatus having a semiconductor laser array for simultaneously scanning the surface of the photosensitive drum to form an electrostatic latent image, which is developed to become a visible toner image, wherein the interval between the light emitting sources in the semiconductor laser array can be set at least at 10 Tm (col. 1, lines 36-48).

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to provide a semiconductor laser array as taught by Ota et al. in the modified device of Takada et al. for the purpose of providing a high-speed optical scanning device.

9. Claims 19 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takada et al. in view of Ota et al.

Takada et al. discloses all the basic limitations of the claimed invention except for the developer for visualization.

However it is old and well known in the art that a latent image is formed by the scanning of the laser beam on the surface of the photosensitive drum, and that the latent image is then developed to become a visible toner image as evidenced by Ota et al. at col. 1, lines 24-28.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to provide the developer unit in the modified device of Takada et al. since Ota et al. teaches this to be known in the printing art to visualize the latent image into a toner image.

Response to Arguments

10. Applicant's arguments filed 01/31/05 have been fully considered but they are not persuasive.

Applicants argue that "in such a scanning optical system of Takada" "the two-[imaging-]lens configuration (lenses 12 and 13) cannot be considered in isolation, but the entire configuration including the transfer optics must be considered as a whole", and that "[I]n this case, according to Takada, a three-lens configuration is applied", indicating that the transfer optics is part of the imaging lenses (12 and 13) and thus performing the specific "image-forming" function of the normal imaging lenses. The

examiner respectfully disagrees. Each of the sets of the imaging lenses (lenses 12 and 13) and the transfer optics (transfer lenses 9 and 10 along with transfer mirrors 8 and 11) has its own distinct function, e.g., the transfer lenses 9 and 10, which are used to refocus the reflected beam b from the first reflecting surface of the polygon mirror onto the second reflecting surface, do not perform the image-forming function of the scanning lenses 12 and 13, and vice-versa. In fact, Takada et al. clearly defines the two functions of the transfer optics as follows:

- (1) "ensuring that the first and second reflecting surfaces of the rotating polygonal mirror are adapted to be conjugated to each other in terms of geometrical optics by means of transfer optics" (col. 6, lines 50-53), which refocus the reflected beam b from the first reflecting surface (4) of the polygon mirror on the second reflecting surface (5) (col. 16, line 64 to col. 17, line 2), and
- (2) ensuring that "the [reflected] optical beam b will move on the second reflecting surface 5 in pace with the movement of the latter" (col. 17, lines 2-5).

It is noted that the second function of the transfer lenses is pertinent to any incident beam on the reflecting surface of the polygon mirror in any single deflection type optical scanning system.

The scanning lenses (12 and 13), on the other hand, still perform their regular functions of:

- (1) ensuring that the second reflecting surface (5) of the polygon mirror and the surface to be scanned (14) are conjugated to each other in terms of geometrical

optics (col. 16, lines 44-48) to compensate for a tilt or positional error of the reflecting plane of the polygon mirror, and

(2) achieving a constant velocity in the scanning of the beam on the surface to be scanned while maintaining a flat field curvature at the imaging plane.

Applicants further argue that "in Takada at the least if the transfer optic 7 is removed from the optical scanning apparatus of Takada it is not possible to create the above-mentioned angle $2\theta_1 + 2\theta_2$ necessary to produce the scan line". However, this is one of the feature of the optical scanning system of Takada, which wants to achieve the above-mentioned scan angle as wide as required such that a predetermined scan width is secured without the need of providing a polygon mirror with a larger area of the reflecting surface leading to an increase of the size of the polygon mirror (col. 4, lines 29-46).

Finally, as the Applicants state that "the transfer optics 7, 9, and 10 in Takada function organically in cooperation with the lenses 12 and 13 to produce the scan line", it is however clear to one of ordinary skill in the art, based on the teaching in Takada, to understand that the above-mentioned transfer optics needed in a dual-deflection type are more adapted to function as pre-deflection optics in a single-deflection type than as post-deflection optics. Therefore, the incorporation of the transfer optics in Takada has no influence on the specific performance of the post-deflection optics assumed solely by the scanning lenses 12 and 13 except for the enlargement of the scan angle to obtain the required scan width.

Based on the above discussion, the current claims are still read on the teaching of Takada et al.

Conclusion

11. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hai C. Pham whose telephone number is (571) 272-2260. The examiner can normally be reached on M-F 8:30AM - 5:30PM.

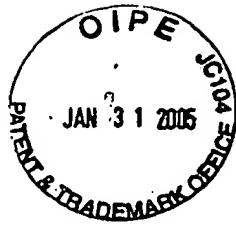
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David L. Talbott can be reached on (571) 272-1934. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Hai Pham

HAI PHAM
PRIMARY EXAMINER

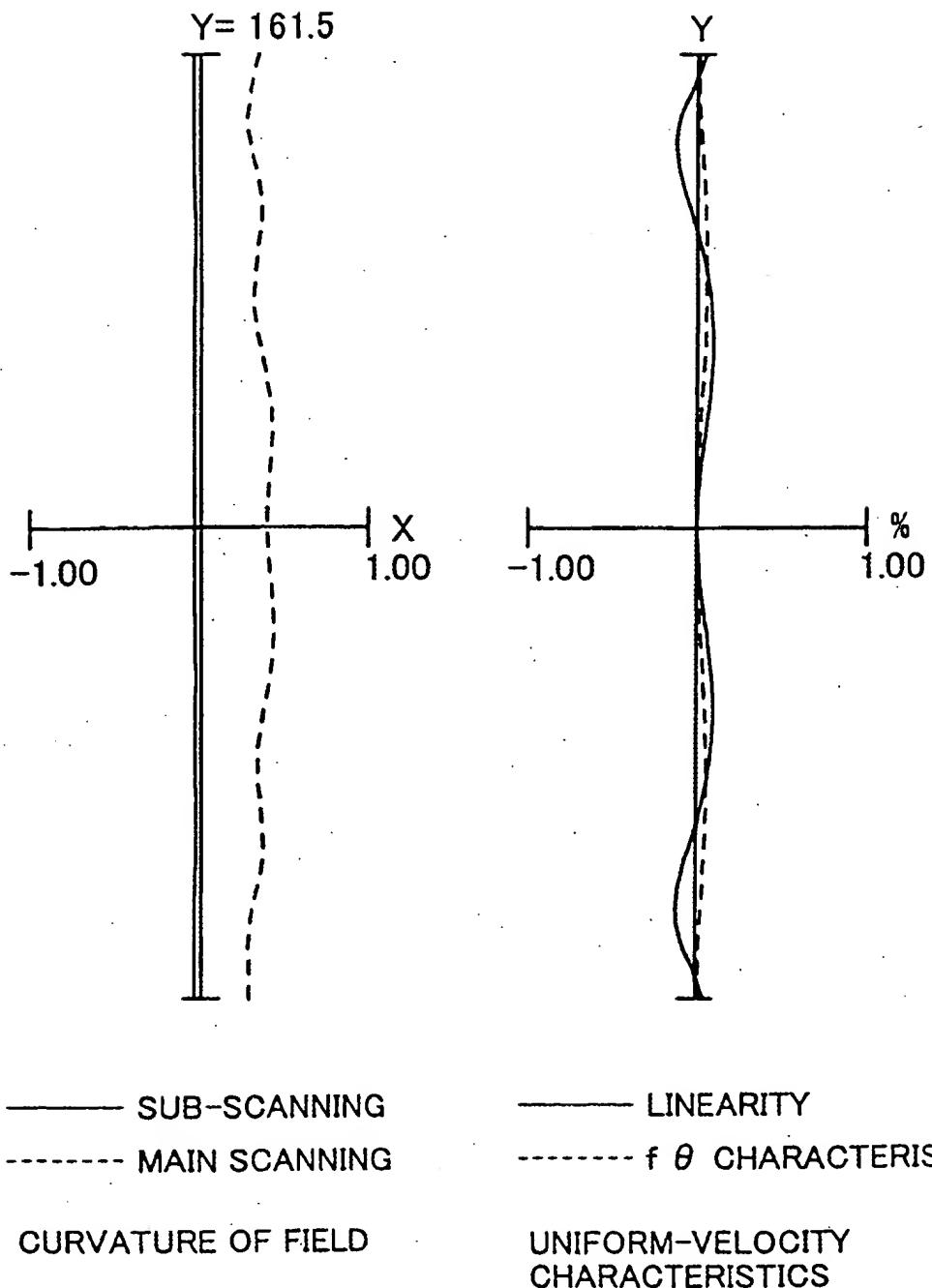
April 23, 2005



OBLON, SPIVAK, ET AL.
DOCKET #: 198004US2
INV: Kohji SAKAI, et al.
SERIAL NO. 09/678,611
REPLY TO OA DATED: November 5, 2004
REPLACEMENT SHEET

Approved
HCB
4/23/05

FIG.4

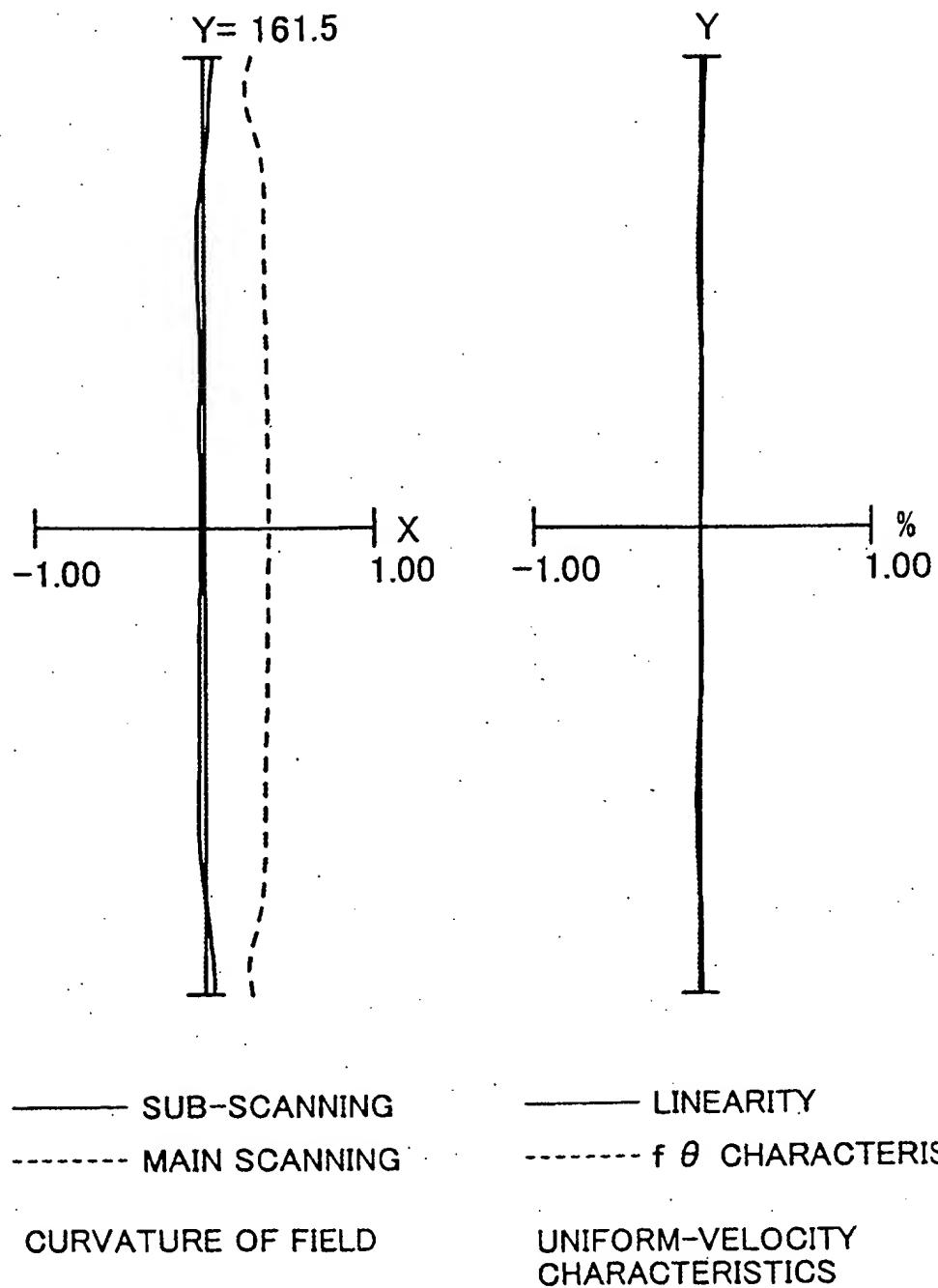




OBLON, SPIVAK, ET AL.
DOCKET #: 198004US2
INV: Kohji SAKAI, et al.
SERIAL N. 09/678,611
REPLY TO OA DATED: November 5, 2004
REPLACEMENT SHEET

Approved
Acb
4/23/05

FIG.9

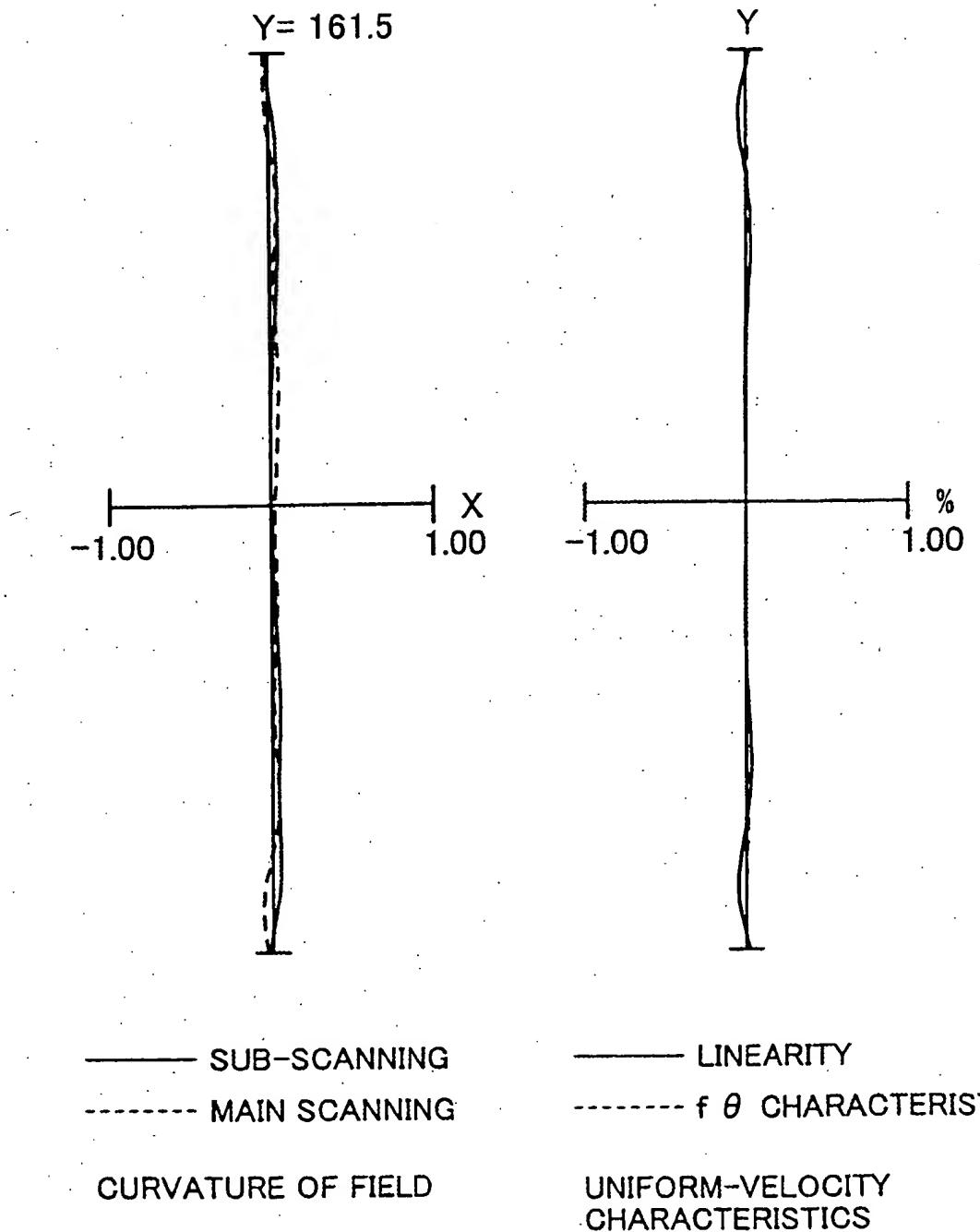




OBLON, SPIVAK, ET AL.
DOCKET #: 198004US2
INV: Kohji SAKAI, et al.
SERIAL NO. 09/678,611
REPLY TO OA DATED: November 5, 2004
REPLACEMENT SHEET

Approved
TCB
4/23/05

FIG.14

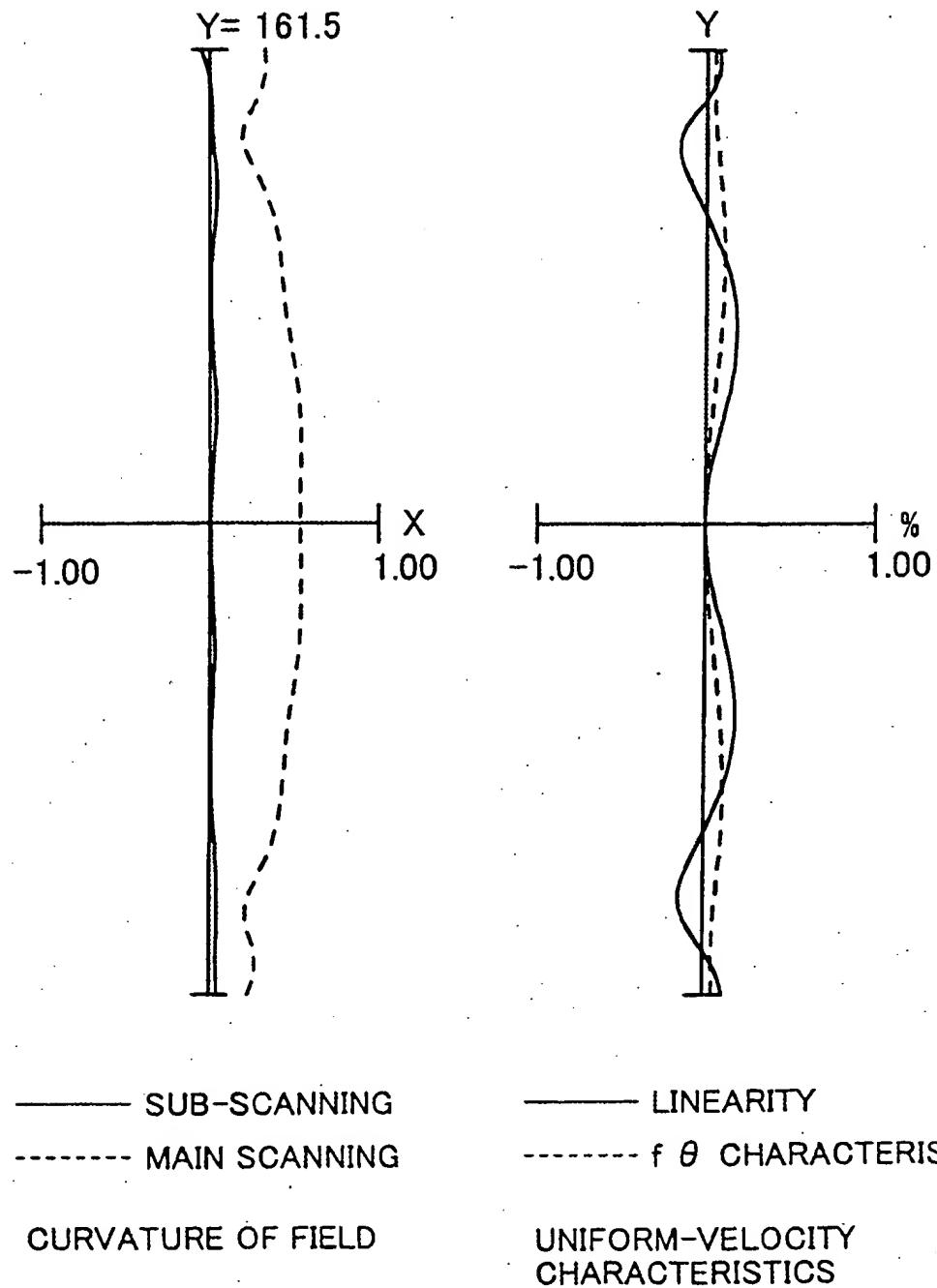




OBLON, SPIVAK, ET AL.
DOCKET #: 198004US2
INV: Koji SAKAI, et al.
SERIAL NO: 09/678,611
REPLY TO OA DATED: November 5, 2004
REPLACEMENT SHEET

Approved
4/23/05

FIG.19

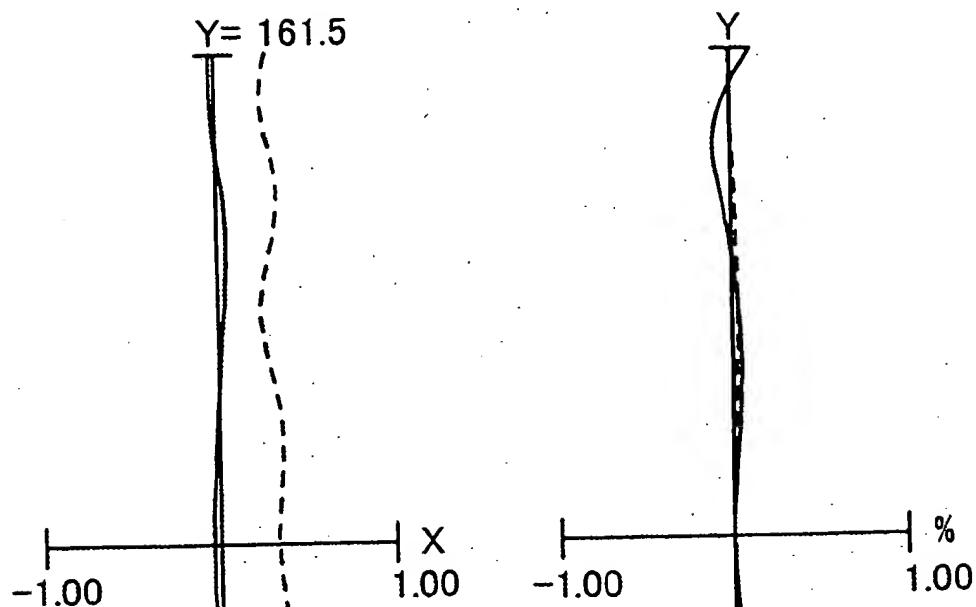




OBLON, SPIVAK, ET AL.
DOCKET #: 198004US2
INV: Kohji SAKAI, et al.
SERIAL NO. 09/678,611
REPLY TO OA DATED: November 5, 2004
REPLACEMENT SHEET

Approved
HCB
4/23/05

FIG.24



— SUB-SCANNING

---- MAIN SCANNING

CURVATURE OF FIELD

— LINEARITY

---- $f\theta$ CHARACTERISTIC

UNIFORM-VELOCITY
CHARACTERISTICS



OBLON, SPIVAK, ET AL.
DOCKET #: 198004US2
INV: Kōji SAKAI, et al.
SERIAL NO. 09/678,611
REPLY TO OA DATED: November 5, 2004
REPLACEMENT SHEET

Approved
HCB
4/23/05

FIG.29

